

Linear Combinations of Vectors

Given vectors $\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_p$ in \mathfrak{R}^n and given scalars $\alpha_1, \alpha_2, \dots, \alpha_p$, the vector \mathbf{y} defined by $\mathbf{y} = \alpha_1\mathbf{v}_1 + \alpha_2\mathbf{v}_2 + \dots + \alpha_p\mathbf{v}_p$ is called a **linear combination** of $\mathbf{v}_1, \mathbf{v}_2, \dots, \mathbf{v}_p$ using **weights** $\alpha_1, \alpha_2, \dots, \alpha_p$.

For example, some linear combinations of vectors \mathbf{v}_1 and \mathbf{v}_2 are $\sqrt{3}\mathbf{v}_1 + \mathbf{v}_2$ or $\frac{1}{2}\mathbf{v}_1 + 0\mathbf{v}_2$.